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ABSTRACT

This document reports on the second year of a project developed to improve the cardiovascular health of elementary school children. The project objectives in the second year were to refine and expand the curriculum which included components on cardiovascular health, nutrition, and physical fitness. Increased family awareness and involvement were also sought. One responsibility assumed by the project was collection of baseline data to establish norms for children ages 6-12 years. Participants were randomly selected for the test and control groups, but children who had participated in the first year of the project were placed in a maintenance group to monitor their progress on a longitudinal basis. Program activities included vigorous physical exercise, classes on nutrition and a health lifestyle, and periodic monitoring of heart rate and lung capacity. Informational packets and a newsletter were sent to parents. Data on the project are presented in both narrative and tabular form and requirements are set forth for implementing a similar program in the public schools. Results indicated a significant improvement in the childrens' physical fitness, nutritional status, and health knowledge. (JD)

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Institute for Experimentation in Teacher Education

State University College at Cortland

Cortland, New York

ANNUAL REPORT

1978-1979

PROJECT SUPERHEART

A Heart Disease Intervention Program for Young Children

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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TABLE OF CONTENTS

PAGE

SUMMARY OF FINDINGS 1

STATEMENT OF THE PROBLEM 2

ATTACKING THE PROBLEM 5

1. The Number and Nature of the Subjects 5

2. The Activities or Treatment Employed 6

3. Collection of Data 8

ANALYZING THE DATA (EVALUATION) 10

1. Hypotheses in Terms of Objectives 10

2. Techniques Used to Handle the Data 11

FINDINGS 13

1. Immediate 13

2. Expected 13

3. Related to Total Project Costs 13

CONCLUSIONS AND RECOMMENDATIONS 15

1. Outcomes 15

2. Features of Original Plan Dropped or Modified 15

3. Recommendations For Others With Similar Needs 18

4. Requirements for Most Successful Implementation of Project 19

SUMMARY OF FINDINGS

The directors of Project SuperHeart with the assistance of the educational researcher found that an intensive program of cardiovascular health education and physical activities can improve test results of children ages 6 - 12 who participate. This was demonstrated by a cardiovascular health knowledge test and a yards per minute run. On both tests, the experimental group scored higher than the control group who had not participated in the intervention program.

STATEMENT OF THE PROBLEM

During the first year of Project SuperHeart, the need for cardiovascular health education and fitness curricula in the elementary school became most apparent. Test data revealed that 38% of the participants had a family history of obesity, 56% had a family history of hypertension and 60% of the families had at least one person who smoked more than ten cigarettes a day. In addition, 38% of the children had a daily fat intake of more than 35% of their total diet. The mean cholesterol level for all children ages 6 - 12 was 185.6 mg/dl as compared to the Muscatine study's findings which showed a mean level of 182 mg/dl (1975). Fifty-five percent of the children had cholesterol levels greater than 180 mg/dl. In assessing the participants' knowledge prior to the intervention program, 90% of the intermediates (ages 9 - 12) scored less than 75% on the knowledge test. On the primary cardiovascular knowledge test, 65% of the children scored less than 75%. In the graded exercise test, 22% of all the children had a maximum heart rate of over 200 beats per minute.

In recent literature the medical community has recognized these concerns. An article by Dr. Howard R. Spivak (1978), instructor at Harvard Medical School and assistant in medicine at Boston Children's Hospital Medical Center, pointed out that cholesterol intake and exercise are increasingly important school health problems because of their long-term effects on health. He indicated that we should re-evaluate the belief in the need for

milk, eggs, and meat and start teaching dietary habits that have a different emphasis. Also, school people should assess school lunch programs to reinforce good dietary habits.

In a recent publication from the New York State Education Department (1978), several doctors made statements in support of a daily physical education program which stresses cardiovascular fitness. Dr. John L. Boyer described cardiovascular disease as the end result of a long process that begins in childhood. He called for vigorous daily physical education at an early age and continuing through secondary school and a change in the lifestyle of parents and family.

Health, Education and Welfare deputy assistant secretary for health, Joyce Lashof, described heart disease as a disease of lifestyle which schools can help remedy by teaching healthful living habits. Peter Relic, HEW deputy assistant secretary for education noted the national boom in jogging, tennis, hiking, bicycling and health foods and suggested that if schools could merely reinforce what has been going on, they could make a powerful contribution. ("Health Education: Schools Lagging Behind Demand for Change," 1978).

In recognition of these needs, the Project SuperHeart target population for 1978-79 was expanded and the objectives for health education, physical education and nutrition were expanded and refined.

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ATTACKING THE PROBLEM

1. The number and nature of the subjects

The Institute for Experimentation in Teacher Education (IETE) is a campus learning center supported by funds from the State University of New York. It is located on the Cortland College campus. The Institute devotes a major share of its resources to educational research and program development and serves many of the college academic departments concerned with teacher preparation.

Located in central New York State, the IETE draws its student body through a lottery system from the surrounding city and counties. This setting provides a mixed population of rural, suburban, and small city dwellers. Although children in Project SuperHeart are between ages 5 - 12, the Institute does include an early childhood component of children ages 3 and 4. Of the total school enrollment of 275, a majority come from white, middle-class families. However, 5% are non-white (three times that of the local public schools) and 15% are from families on public assistance.

Information concerning Project SuperHeart was sent to the parents of all IETE students during the summer of 1978 with a request to sign informed consent forms for their children to participate in the second year of the program. Out of the 150 returned consent forms, 43 children were randomly selected for the control group and 71 children were randomly selected for

participation in Project SuperHeart. When one child from a family was chosen for the control group, the remaining children were also placed in that group to minimize contamination of the experimental group. Children who had participated in the first year of Project SuperHeart, were automatically placed in a maintenance group to monitor their progress on a longitudinal basis.

For instructional and testing purposes, the groups were further divided into primary (ages 5 - 8) and intermediate (ages 9 - 12). The cut-off date of November 30 was used in determining the child's age. Table I indicates the number of the participants in each group at the beginning and end of the program.

TABLE I

SUPERHEART PARTICIPANTS

Group	Primary Number		Intermediate Number		Total Number	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Experimental	46	38	25	24	71	62
Control	25	22	18	16	43	38
Maintanance	9	9	15	15	24	24
Total	80	69	58	55	138	124

2. The activities or treatment employed

After pre-testing all participants, the groups were divided so that only the experimental group received the intervention program. Control group participants continued to attend physical

education and health classes which did not emphasize cardiovascular health and fitness.

The program consisted of one forty-minute SuperHeart class each school day from October 15, 1978 to April 15, 1979, a six-month period of time. Three days a week the experimental group was involved in cardiovascular activities in the gym, swimming pool or playground. They were instructed in pulse-taking, monitoring an effective exercise program, stretching and warm-up activities, cool-down activities, and skill development. Emphasis was placed on innovative activities and games to achieve cardiovascular fitness. These activities were supplemented by jogging/running, swimming, ice skating, cross-country running and interval training.

Two days a week, the experimental group attended classes in the SuperHeart classroom. A curriculum which emphasized risk factor reduction and nutrition was presented. Audio-visuals, models, and charts were used as well as hands-on experiences to illustrate the advantages of a healthy lifestyle. Periodically, students were provided with informational packets to take home to parents.

To increase parental awareness of the risks of cardiovascular disease and the benefits of a healthy lifestyle, a bi-monthly newsletter, The Main Artery was initiated. Experts from all over the United States as well as on the local campus were asked to submit articles on different aspects of cardiovascular disease prevention in young children. Besides circulation to parents and persons involved in the project, The Main Artery has about 100 subscribers after two issues.

3. Collection of data

Pre-test data were collected on all participants during the first two weeks in October and post-test data during the last two weeks in April. Table II indicates the data collected and the instrumentation used.

TABLE II

INSTRUMENTATION FOR DATA COLLECTION PROJECT SUPERHEART

SuperHeart Objective	Data Collection	Instrumentation
Cardiovascular Fitness	Heart rate after 3 minutes of exercise	SuperHeart Step Test
	Yards per minute run	Manitoba Physical Fitness Test
		AAHPER Run/Walk Test
Knowledge about Cardiovascular Health, Nutrition and Fitness	Number of correct responses on	
	Primary Test of 50 items	Primary SuperHeart Knowledge Test
	Intermediate Test of 50 items	Intermediate SuperHeart Knowledge Test

Additional data collection was carried out at Crawford-Craven Elementary School in Liverpool, New York, and Oswego Elementary School in Oswego, New York. These sites were used to test the reliability of the SuperHeart step test and the SuperHeart primary and intermediate knowledge tests.

Other measures of evaluating students' status were used experimentally to test their replicability in a public school setting, not to evaluate the program. Measurement of blood pressure, for instance, is considered a worthwhile screening test by the New York State Education Department even at the elementary school level. A blood test for cholesterol and triglyceride levels was done on a small voluntary group in the interests of research. In an attempt to discover an accurate and simple test for body fat percentages, skin fold measurements were taken using Halpenden calipers. Traditional height and weight measurements were taken to monitor growth and make students aware of their size in relation to standardized charts. Vital lung capacity was measured with a spirometer to test the effectiveness of its use in a program to monitor physical fitness. Because of time consumed administering the test as related to its low return of information, the vital capacity measurement was omitted from the post-test battery.

ANALYZING THE DATA

1. Hypotheses in terms of objectives

Four objectives were defined for Project SuperHeart:

A. Children in grades 1 - 3 will demonstrate significant increase ($p < .05$) in knowledge about cardiovascular health, nutrition and physical fitness as a result of classroom instruction during the 1978-79 school year as measured by the Primary SuperHeart Knowledge Test.

B. Children in grades 1 - 3 will demonstrate significant increase ($p < .05$) in cardiovascular fitness as a result of cardiovascular physical education activities during the 1978-79 school year as measured by the Primary SuperHeart Step Test and by either the AAHPER Physical Fitness 600 yard Run/Walk Test or the Manitoba Schools Physical Fitness Performance Test.

C. Children in grades 4 - 6 will demonstrate significant increase ($p < .05$) in knowledge about cardiovascular health, nutrition and physical fitness as a result of classroom instruction during the 1978-79 school year as measured by the Intermediate SuperHeart Knowledge Test.

D. Children in grades 4 - 6 will demonstrate significant increase ($p < .05$) in cardiovascular fitness as a result of cardiovascular physical education activities during the 1978-79 school year as measured by the Intermediate SuperHeart Step Test and by either the AAHPER Physical

Fitness 600 yard Run/Walk Test or the Manitoba Schools Physical Fitness Performance Test.

2. Techniques used to handle data

A pre-post test control group experimental design was used to evaluate this program. Table I, page 6, shows the number of children in each of the groups during pre- and post-testing. Data were analyzed separately for the primary and intermediate children since the primary curriculum was different from the intermediate curriculum. The instruments used to collect data are described in Table II, page 8. The data were analyzed using the t test for independent groups. The maintenance groups were excluded from these analyses because they had reached the upper limit of the knowledge test on cardiovascular health and, also, the primary maintenance group was very small. The maintenance groups were monitored to make sure they maintained their previous level of performance.

Pre-test results showed that there were no significant differences between the primary experimental and control groups or between the intermediate experimental and control groups at the beginning of the program this year.

The step test to measure cardiovascular fitness was adapted from an adult step test. Pulse rates were taken after three minutes of exercise. The project directors and an exercise physiologist were very cautious in revising the step test for use with children. However pre-testing showed that the revised test was not rigorous enough for the children and therefore produced

low pulse rates that lacked variability among children. The step test has now been revised a second time and preliminary testing indicates that it will now be rigorous enough to produce higher pulse rates with more variability among children. Because of these difficulties with the step test, it was not used to evaluate the program this year. Cardiovascular fitness was measured using the yards per minute run.

FINDINGS

1. Immediate

The results from this year's testing are shown in Table III, page 14. It can be seen that the primary experimental group scored higher on the primary knowledge test on cardiovascular health and on the yards per minute run than did the primary control group. The intermediate experimental group also scored higher on the intermediate knowledge test on cardiovascular health than did the intermediate control group. The intermediate experimental group scored higher than the intermediate control group on the yards per minute run although the results were not significant at the .05 level. Mean scores for the maintenance groups were just slightly higher than those for the experimental groups for all testing.

2. Expected

Although the intermediate experimental group was not significantly different from the control group at the .05 significance level, the experimental group did score higher on the yards per minute run than did the control group. The .10 probability for this t-value approached the .05 significance level and indicated a tendency for the experimental group to score higher on this objective.

3. Related to total project costs

Most of the large expenses for Project SuperHeart are related to developing the curriculum and evaluating the program. Project

SuperHeart is not an expensive program for a school district to implement. Most costs are start-up expenses, e.g., training personnel to teach the curriculum and initial curricular materials. The positive findings for this project and the relatively inexpensive program costs make this project a practical and beneficial program for children.

TABLE III

POST-TEST RESULTS FOR PROJECT SUPERHEART OBJECTIVES

Objective	Number	Mean	Standard Deviation	t-value	probability
Obj. 1: Primary SuperHeart Knowledge Test				2.42	.02*
Experimental	38	43.6	4.9		
Control	22	40.1	6.0		
Obj. 2: Manitoba Schools Physical Fitness Performance Run Test				2.02	.05*
Experimental	38	227.3			
Control	22	182.5			
Obj. 3: Intermediate SuperHeart Knowledge Test				3.40	.00*
Experimental	24	30.7			
Control	14	24.5			
Obj. 4: AAHPER Physical Fitness 600-yard Run/Walk Test				1.68	.10
Experimental	24	205.3			
Control	14	186.3			

*p < .05

CONCLUSIONS AND RECOMMENDATIONS

1. Outcomes

The student outcomes related to the SuperHeart curriculum (cardiovascular fitness and knowledge about cardiovascular fitness, health and nutrition) indicate that the SuperHeart program does have a positive effect on children. Children in the second year of SuperHeart participation maintained their performance levels. Furthermore it is a relatively inexpensive program for a school district to implement. It is widely recognized that prevention of heart disease needs to begin early before lifetime habits are conditioned. Schools are able to provide the setting for lifestyle changes conducive to good cardiovascular health for the general population of children.

2. Features of original plan dropped or modified, continuance of program by district.

During the 1978-79 year for Project SuperHeart, changes were made in the testing program to increase its feasibility for public school implementation.

The urinalysis for glucose was deleted. This test is done routinely in the physical exam and any abnormalities would be detected by the physician or school nurse.

The run/walk test was adapted for the younger age group and a system devised to administer it more efficiently to larger groups of children.

A new SuperHeart Step Test was devised with the help of Dr. William Tomik of the SUNY - Cortland Human Performance Laboratory. Benches were built to the height that was appropriate for children from the shortest to the longest leg length. Dr. Tomik made a cassette tape recording which gave the children and teachers instructions on how to proceed with the Step Test and actually counted out the stepping for the three minute allotted time. A group of 12 children were taken to the testing laboratory directed by Dr. Douglas Garfield at Syracuse University. There, they were given a treadmill test with O_2 uptake measured by a Beckman analyzer to validate the Step Test results. Validation of this test will continue during the third project year.

Although vital lung capacity was measured during the pretesting in October, 1978, a decision was made to drop this test from the program. It was felt that public schools could not afford the time or equipment needed to do this additional test. Vital lung capacity is another way of measuring physical fitness capacity which is already being measured by the Step Test and the run/walk test.

The blood cholesterol measurement was done on a solely voluntary basis. This year, a high density lipoprotein differential was included. This is felt to be more indicative of risk factor for coronary heart disease than total cholesterol determination. Indeed, the information obtained on the small group of volunteers was more definitive and did allow some conclusions to be drawn concerning the effects of an activity program on the HDL-LDL

level. This phase of the program will not be included in the 1979-80 project. At $10.00 for each blood test, the cost is prohibitive for any school system. Also, it is a psychological block to the motivation of the students and acceptance of the total SuperHeart program. However, because of the value of the HDL differentiation in assessing the individual's risk factor for CHD and the contribution to research that the collection of that information could provide, the test will not be completely abandoned. Special funding and a willing group of volunteers would induce the directors to do further data collection in this area.

The primary and intermediate SuperHeart Knowledge Tests were modified and expanded to 50 written questions each. Reliability checks were done on elementary students in Oswego and Liverpool, New York. Additional modifications are expected to be necessary to the primary test during the next project year.

Scheduling modifications were also made during the 1978-79 project year. These changes were necessary to make the program more realistic for public schools. Classroom instruction was reduced from five - 40-minute periods per week to two 40-minute periods per week. Physical education classes were reduced from five 40-minute periods per week to three 40-minute periods per week. This schedule is thought to be the minimum needed to show gains in physical fitness and health knowledge. Data collected was intended in part to show that these levels of instruction are both necessary and productive in the public school setting.

3. Recommendations for others with similar needs.

On May 17th and 18th, 1979 curriculum worksessions were conducted by the directors of Project SuperHeart to ascertain the needs of physical and health educators in public schools who may wish to adopt the program. Educators from all over New York State including Long Island, Buffalo, Syracuse, Ithaca, Homer and Gowanda attended. The following are some of the conclusions drawn from the worksessions:

A. A new approach to physical education is being sought and a cardiovascular fitness framework is desirable.

B. Adult concern with health and cardiovascular fitness makes this an appropriate time to encourage new programming in both PE and Health.

C. Concern for nutrition education is included in a wholistic approach to health and fitness.

D. The curriculum must be flexible enough to meet the needs of a variety of school settings, sizes, schedules, and staffing arrangements.

Our recommendation to participants in the worksessions was to begin to lay the groundwork for the new programming. This would include lining up staff interested in initiating the program: classroom teachers, school health personnel, PE teachers, food service personnel, and parents. These people would form a support group to present the program to administrators, Boards of Education, and other community groups. Portions of the program can be tested on small groups of children; for example, running clubs,

classroom units on nutrition, or a blood pressure screening program. Plans should include staff training and parent education meetings. Schools that lay this groundwork will be ready to write a replicator grant within a couple of years.

4. Requirements for the most successful implementation of Project SuperHeart.

   A. Pre- post-testing batteries which include blood pressure reading, resting pulse rate, SuperHeart Knowledge Test, SuperHeart Step Test, and run/walk test.

   B. Three physical education classes per week (minimum) which include five minutes of warm-up or stretching activities, twenty minutes of continuous physical activity which maintains the child's heart rate in the target zone, and 5 - 10 minutes of cool-down activities during which the heart rate returns to the pre-activity rate.

   C. Two health education classes per week which include instruction in the structure and function of the cardiovascular system, cardiovascular disease prevention, nutrition education, and cardiopulmonary emergency care.

   D. A strictly interpreted Type A school lunch program which limits offerings of foods high in saturated fats, sugar, and salt. Also, there should be no opportunity for the students to purchase junk foods within the school environs, i.e., candy machines, school stores, or baked food sales.

Documentation of Adoptions/adaptions

Data collection is intended to show that significant improvement in the child's physical fitness, nutritional status, and health knowledge is demonstrated through adoption of Project SuperHeart.